

IN THE CLAIMS:

The following is a complete listing of the claims, and replaces all earlier versions and listings.

1. (Currently Amended) ~~Method~~ A method for encoding a source sequence of symbols (u) as an encoded sequence, ~~characterised in that it includes~~ comprising steps according to which:

[[-]] a first operation is performed₁ of division into sub-sequences and encoding ~~[[(508)]]~~, consisting of dividing ~~said the~~ source sequence (u) into p_1 first sub-sequences (U_i), p_1 being a positive integer, and encoding each of the first sub-sequences (U_i) using a first circular convolutional encoding method;

[[-]] an interleaving operation ~~[[(506)]]~~ is performed, ~~consisting of~~ interleaving ~~said the~~ source sequence (u) into an interleaved sequence (u^*); and

[[-]] a second operation is performed₁ of division into sub-sequences and encoding ~~[[(507)]]~~, ~~consisting of~~ including dividing ~~said the~~ interleaved sequence (u^*) into p_2 second sub-sequences (U'_i), p_2 being a positive integer, and encoding each of ~~said the~~ second sub-sequences (U'_i) ~~by means of using~~ a second circular convolutional encoding method₁ ~~[[;]]~~

[[-]] at least one of the integers p_1 and p_2 being strictly greater than 1 and at least one of ~~said the~~ first sub-sequences (U_i) not being interleaved into any of ~~said the~~ second sub-sequences (U'_j).

(It is noted that the above underlining of the following symbols is original, and is meant to be permanent: u, U_i , u^* , U'_i , U'_j)

2. (Currently Amended) Encoding The encoding method according to Claim 1, characterised in that which said first or second circular convolutional encoding method includes:

[[-]] a pre-encoding step, consisting of defining the an initial state of the said encoding method for the sub-sequence in question, so as to produce a pre-encoded sub-sequence, and

[[-]] a circular convolutional encoding step.

3. (Currently Amended) Encoding The encoding method according to Claim 2, characterised in that which said pre-encoding step for one of said the first sub-sequences (U_i) and said circular convolutional encoding step for another one of said the first sub-sequences (U_j) already pre-encoded are performed simultaneously.

(It is noted that the above underlining of U_i and U_j is original, and is meant to be permanent.)

4. (Currently Amended) Encoding The encoding method according to any one of the preceding claims, characterised in that which the integers p_1 and p_2 are equal.

5. (Currently Amended) Encoding The encoding method according to any one of Claims 1-3, characterised in that the in which sizes of all the sub-sequences are identical.

6. (Currently Amended) ~~Encoding~~ The encoding method according to any one of the preceding claims, ~~characterised in that which~~ said first and second circular convolutional encoding methods are identical.

7. (Currently Amended) ~~Encoding~~ The encoding method according to any one of Claims 1-3, ~~characterised in that it further includes~~ further comprising steps according to which:

[[-]] an additional interleaving operation is performed, ~~consisting of~~ interleaving ~~the a~~ parity sequence (\underline{v}_1) resulting from ~~the said~~ first operation of dividing into sub-sequences and encoding ~~[[(508)]]~~; and

[[-]] a third operation is performed, of division into sub-sequences and encoding, ~~consisting of including~~ dividing the interleaved sequence, obtained at the end of the additional interleaving operation, into p_3 third sub-sequences (\underline{U}''_i), p_3 being a positive integer, and encoding each of ~~said the~~ third sub-sequences (\underline{U}''_i) ~~by means of using~~ a third circular convolutional encoding method.

(It is noted that the above underlining of the following symbols is original, and is meant to be permanent: \underline{v}_1 and \underline{U}''_i)

8. (Currently Amended) ~~Device~~ A device for encoding a source sequence of symbols (\underline{u}) as an encoded sequence, ~~characterised in that it has~~ comprising:

[[-]] first means for dividing into sub-sequences and encoding ~~(205, 202)~~, for dividing ~~said the~~ source sequence (\underline{u}) into p_1 first sub-sequences (\underline{U}_i), p_1 being a

positive integer, and for encoding each of ~~said the~~ first sub-sequences (\underline{U}_i) ~~by means of~~
using first circular convolutional encoding means;

[[-]] interleaving means (203), for interleaving ~~said the~~ source sequence
(\underline{u}) into an interleaved sequence (\underline{u}^*); and

[[-]] second means for dividing into sub-sequences and encoding (206;
204), for dividing ~~said the~~ interleaved sequence (\underline{u}^*) into p_2 second sub-sequences (\underline{U}'_i), p_2
being a positive integer, and for encoding each of ~~said the~~ second sub-sequences (\underline{U}'_i) ~~by~~
~~means of~~ using second circular convolutional encoding means, [[;]] at least one of the
integers p_1 and p_2 being strictly greater than 1 and at least one of ~~said the~~ first
sub-sequences (\underline{U}_i) not being interleaved into any of ~~said the~~ second sub-sequences (\underline{U}'_i).
(It is noted that the above underlining of the following symbols is original, and is meant to
be permanent: \underline{u} , \underline{U}_i , \underline{u}^* , \underline{U}'_i , \underline{U}'_j)

9. (Currently Amended) ~~Encoding~~ The encoding device according to
Claim 8, ~~characterised in that~~ which said first or second circular convolutional encoding
means have:

[[-]] pre-encoding means, for defining ~~the~~ an initial state of ~~the~~ said
encoding means for the sub-sequence in question, so as to produce a pre-encoded
sub-sequence, and

[[-]] circular convolutional encoding means proper.

10. (Currently Amended) ~~Encoding~~ The encoding device according to Claim 9, ~~characterised in that~~ which said pre-encoding means process one of ~~said~~ the first sub-sequences (\underline{U}_i) at the same time as said circular convolutional encoding means proper process another of ~~said~~ the first sub-sequences (\underline{U}_j) already pre-encoded.

(It is noted that the above underlining of \underline{U}_i and \underline{U}_j is original, and is meant to be permanent.)

11. (Currently Amended) ~~Encoding~~ The encoding device according to Claim 8, 9 or 10, ~~characterised in that~~ which the integers p_1 and p_2 are equal.

12. (Currently Amended) ~~Encoding~~ The encoding device according to any one of Claims 8 to 10, ~~characterised in that the~~ in which sizes of all the sub-sequences are identical.

13. (Currently Amended) ~~Encoding~~ The encoding device according to any one of Claims 8 to 10, ~~characterised in that~~ which said first and second circular convolutional encoding means are identical.

14. (Currently Amended) ~~Encoding~~ The encoding device according to any one of Claims 8 to 10, ~~characterised in that it further has~~ further comprising:

[[-]] additional interleaving means, for interleaving ~~the~~ a parity sequence (v₁) supplied by ~~the said~~ first means ~~of for~~ dividing into sub-sequences and encoding (205; 202); and

[[-]] third means ~~of for~~ dividing into sub-sequences and encoding, for dividing the interleaved sequence, supplied by said additional interleaving means, into p₃ third sub-sequences (U"_i), p₃ being a positive integer, and for encoding each of said third sub-sequences (U"_i) ~~by means of using~~ third circular convolutional encoding means.
(It is noted that the above underlining of the following symbols is original, and is meant to be permanent: v₁ and U"_i)

15. (Currently Amended) ~~Method~~ A method for decoding a sequence of received symbols, ~~characterised in that it is~~ adapted to decode a sequence encoded by an encoding method according to any one of Claims 1 to 3.

16. (Currently Amended) ~~Decoding~~ The decoding method according to Claim 15, using a turbodecoding, ~~characterised in that~~ which there are performed iteratively:

[[-]] a first operation of dividing into sub-sequences [[(711)]], applied to the received symbols representing the source sequence (u) and a first parity sequence (v₁), and to the a priori information (w₄) of the source sequence (u);

[[-]] for each triplet of sub-sequences representing a sub-sequence encoded by a circular convolutional code, a first elementary decoding operation [[(703)]],

adapted to decode a sequence encoded by a circular convolutional code and supplying a sub-sequence of extrinsic information on a sub-sequence of the source sequence (u);

[[-]] an operation of interleaving [[(705)]] the sequence (w₁) formed by the sub-sequences of extrinsic information supplied by said first elementary decoding operation [[(703)]];

[[-]] a second operation of dividing into sub-sequences [[(712)]], applied to the received symbols representing the interleaved sequence (u^{*}) and a second parity sequence (v₂), and to the a priori information (w₂) of the interleaved sequence (u^{*});

[[-]] for each triplet of sub-sequences representing a sub-sequence encoded by a circular convolutional code, a second elementary decoding operation [[(706)]], adapted to decode a sequence encoded by a circular convolutional code and supplying a sub-sequence of extrinsic information on a sub-sequence of the interleaved sequence (u^{*});

[[-]] an operation of deinterleaving [[(708)]] the sequence (w₃) formed by the extrinsic information sub-sequences supplied by said second elementary decoding operation [[(706)]].

(It is noted that the above underlining of the following symbols is original, and is meant to be permanent: u, u^{*}, v₁, v₂, w₁, w₂, w₃, w₄)

17. (Currently Amended) ~~Device~~ A device for decoding a sequence of received symbols, ~~characterised in that it is adapted to decode a sequence encoded by~~ means of using an encoding device according to any one of Claims 8 to 10.

18. (Currently Amended) ~~Decoding~~ The decoding device according to Claim 17, using a turbodecoding, ~~characterised in that it has~~ comprising:

[[~~-~~]] first means ~~of~~ for dividing into sub-sequences ~~[[~~(417)~~]]~~, applied to the received symbols representing the source sequence (\underline{u}) and a first parity sequence (\underline{v}_1), and to the a priori information (\underline{w}_4) of the source sequence (\underline{u});

[[~~-~~]] first elementary decoding means ~~[[~~(404)~~]]~~, operating on each triplet of sub-sequences representing a sub-sequence encoded by a circular convolutional code, for decoding a sequence encoded by a circular convolutional code and supplying a sub-sequence of extrinsic information on a sub-sequence of the source sequence (\underline{u});

[[~~-~~]] means ~~(405)~~ of for interleaving the sequence (\underline{w}_1) formed by the sub-sequences of extrinsic information supplied by said first elementary decoding means ~~(404)~~;

[[~~-~~]] second means ~~of~~ for dividing into sub-sequences ~~[[~~(419)~~]]~~, applied to the received symbols representing the interleaved sequence (\underline{u}^*) and a second parity sequence (\underline{v}_2), and to the a priori information (\underline{w}_2) of the interleaved sequence (\underline{u}^*);

[[~~-~~]] second elementary decoding means ~~[[~~(406)~~]]~~, operating on each triplet of sub-sequences representing a sub-sequence encoded by a circular convolutional code, for decoding a sequence encoded by a circular convolutional code and supplying a sub-sequence of extrinsic information on a sub-sequence of the interleaved sequence (\underline{u}^*);

[[~~-~~]] means ~~(407)~~ of for deinterleaving the sequence (\underline{w}_3) formed by the sub-sequences of extrinsic information supplied by said second elementary decoding means ~~(406)~~,

[[-]] said means of dividing into sub-sequences (~~417, 419~~), of elementary decoding (~~404, 406~~), of interleaving (~~405~~) and of deinterleaving (~~407~~) operating iteratively. (It is noted that the above underlining of the following symbols is original, and is meant to be permanent: u, u^{*}, v₁, v₂, w₁, w₂, w₃, w₄)

19. (Currently Amended) ~~Digital~~ A digital signal processing apparatus, characterised in that it has having means adapted to implement an encoding method according to any one of Claims 1 to 3.

20. (Currently Amended) ~~Digital~~ A digital signal processing apparatus, characterised in that it has having an encoding device according to any one of Claims 8 to 10.

21. (Currently Amended) ~~Telecommunications~~ A telecommunications network, characterised in that it has having means adapted to implement an encoding method according to any one of Claims 1 to 3.

22. (Currently Amended) ~~Telecommunications~~ A telecommunications network, characterised in that it has having an encoding device according to any one of Claims 8 to 10.

23. (Currently Amended) ~~Mobile~~ A mobile station in a telecommunications network, ~~characterised in that it has~~ having means adapted to implement an encoding method according to any one of Claims 1 to 3.

24. (Currently Amended) ~~Mobile~~ A mobile station in a telecommunications network, ~~characterised in that it has~~ having an encoding device according to any one of Claims 8 to 10.

25. (Currently Amended) ~~Device~~ A device for processing signals representing speech, ~~characterised in that it includes~~ having an encoding device according to any one of Claims 8 to 10.

26. (Currently Amended) ~~Data~~ A data transmission device having a transmitter adapted to implement a packet transmission protocol, ~~characterised in that it includes~~ and an encoding device according to any one of Claims 8 to 10.

27. (Currently Amended) ~~Data~~ A data transmission device according to Claim 26, ~~characterised in that said~~ which the protocol is of ~~the ATM~~ an Asynchronous Transfer Mode type.

28. (Currently Amended) ~~Data~~ A data transmission device according to Claim 26, ~~characterised in that said~~ in which the protocol is of the ~~IP~~ an Internet Protocol type.

29. (Currently Amended) Information storage means, which can be read by a computer or microprocessor storing instructions of a computer program, ~~characterised in that it implements~~ implementing an encoding method according to any one of Claims 1 to 3.

30. (Currently Amended) Information storage means, which can be read by a computer or microprocessor storing instructions of a computer program, ~~characterised in that it implements~~ implementing a decoding method according to Claim 15.

31. (Currently Amended) Information storage means, which is removable, partially or totally, which can be read by a computer or microprocessor storing instructions of a computer program, ~~characterised in that it implements~~ implementing an encoding method according to any one of Claims 1 to 3.

32. (Currently Amended) Information storage means, which is removable, partially or totally, which can be read by a computer or microprocessor storing instructions of a computer program, ~~characterised in that it implements~~ implementing a decoding method according to Claim 15.

33. (Currently Amended) ~~Computer~~ A computer program containing sequences of instructions, ~~characterised in that it implements~~ implementing an encoding method according to any one of Claims 1 to 3.

34. (Currently Amended) ~~Computer~~ A computer program containing sequences of instructions, ~~characterised in that it implements~~ implementing a decoding method according to Claim 15.